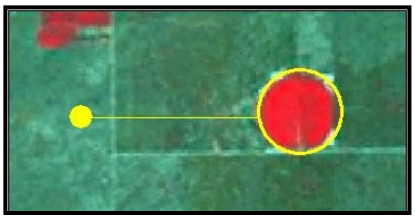
Monitoring Aquifer Depletion

In Idaho, surface water diversions have been more closely monitored than have been wells. The Idaho Department of Water Resources monitors the irrigation wells on the Eastern Snake River Plain using power-meter records, which costs approximately $500,000 per year. This cost can be reduced significantly using Landsat thermal data in the METRIC model by computing evapotranspiration rather than estimating the volume of water pumped.

The data in this analysis are 1) water-right polygons, 2) the well associated with each polygon, 3) the power records for the wells, 4) the seasonal, cumulative evapotranspiration as computed by the METRIC model. The Idaho Department of Water Resources chose simple well-field systems in which one well supplied one field.

The graphs below show the power meter data and evapotranspiration derived using Landsat thermal data in the METRIC model plotted with the extremes of alfalfa and pea evapotranspiration computed by the U.S. Bureau of Reclamation's AgriMet system.

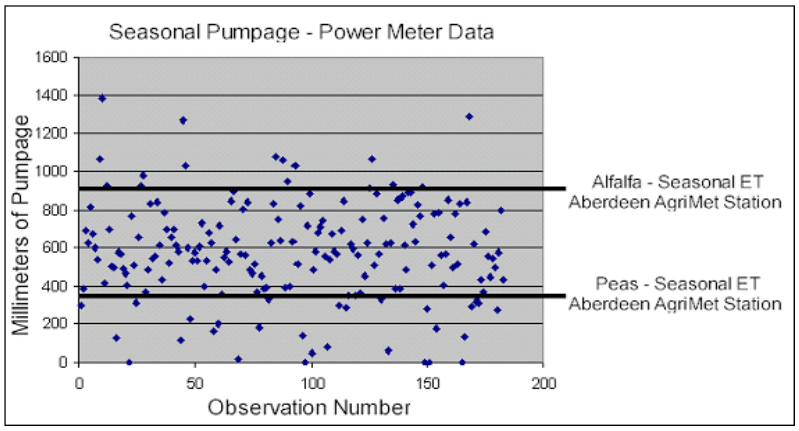
The power-meter data show no consistent pattern, with many data below the level for peas, the practical minimum. The METRIC data fall as expected between a distinct base at approximately 600 mm, and the maximum evapotranspiration of approximately 900 mm for alfalfa.



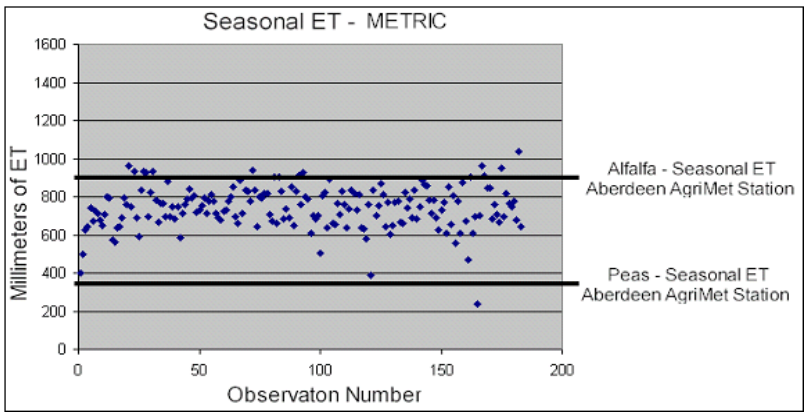
One well supplies one field.

It is important to understand that the two data sets are quite different. Power meter data are a surrogate for amount of water pumped from wells; evapotranspiration is the amount of water evaporated and transpired from soil and vegetation in the field.

The results of this analysis make a compelling case for using Landsat thermal data and the METRIC evapotranspiration model. The benefits are in cost savings, improved data-quality, and faster data processing.



Power meter data.
Approximately $119 per well



METRIC evapotranspiration data.
Approximately $32 per well